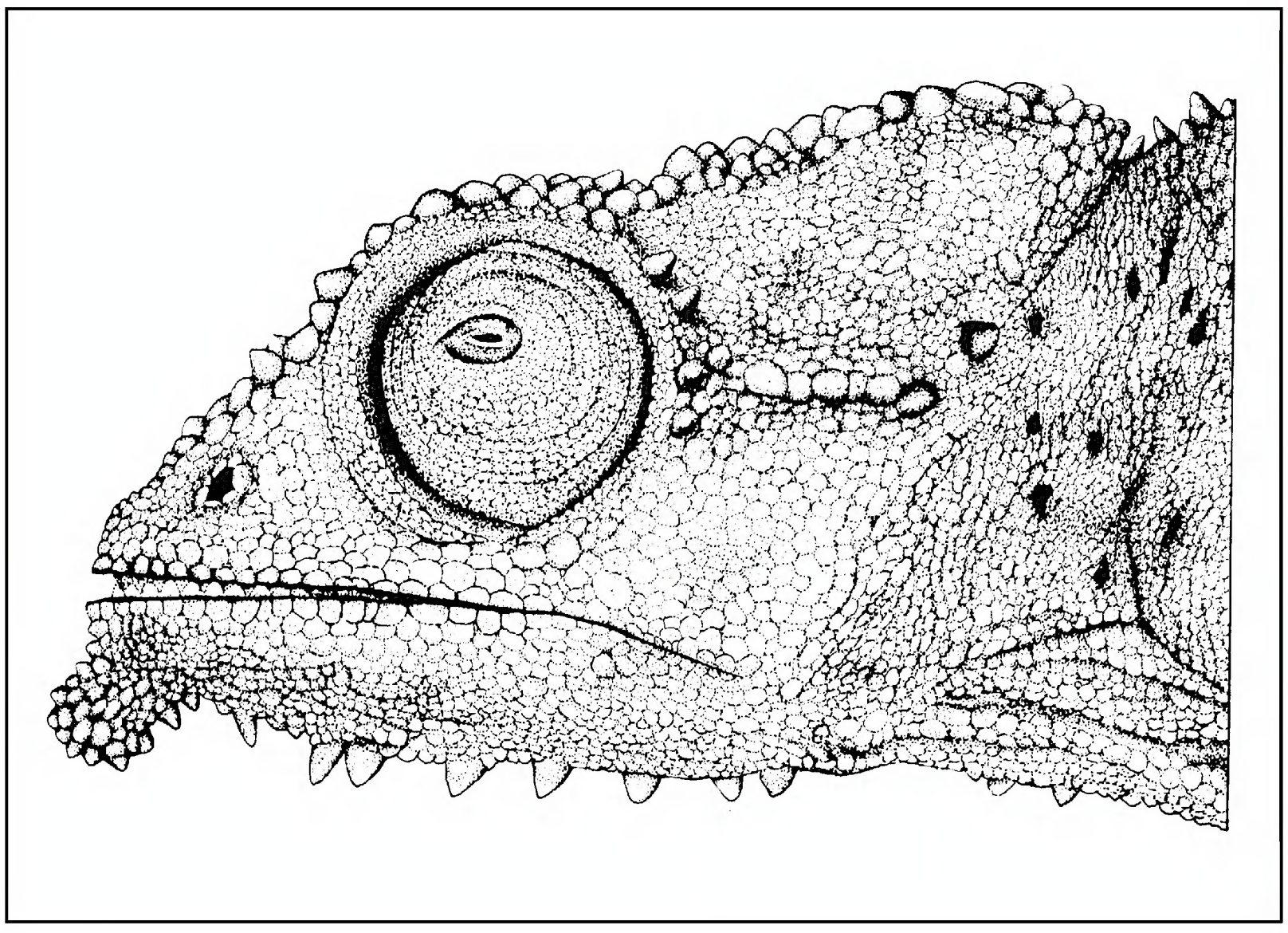
# BULLETIN
## of the
# Chicago Herpetological Society

**Volume 48, Number 8**
**August 2013**

# BULLETIN OF THE CHICAGO HERPETOLOGICAL SOCIETY
## Volume 48, Number 8
## August 2013


A Danger to Snakes in the Garden . . . . . David G. Barker 101

Axial Bifurcation and Duplication in Snakes. Part V. A Review of *Nerodia sipedon* Cases with a New Record from New York State . . . . . Van Wallach and Gerard T. Salmon 102

Notes on Reproduction of Orange-throated Whiptail Lizards, *Aspidoscelis hyperythra* (Squamata: Teiidae), from California . . . . . Stephen R. Goldberg 107

Frog City: VIII. An All-American Toad . . . . . Ilene Sievert 109

What You Missed at the July Meeting . . . . . John Archer 111

The Tympanum . . . . . Lena M. Lindén, Phil Bishop and Onnie Byers 112

Herpetology 2013 . . . . . 113

Unofficial Minutes of the CHS Board Meeting, July 19, 2013 . . . . . 115

Advertisements . . . . . 116


**Cover:** Tiger chameleon, *Archaius tigris*, a Seychelles endemic. Drawing (as *Chamaeleo tigris*) from "Faune de Madagascar 47 — Reptiles. Sauriens Chamaeleonidae. Genre *Brookesia* et Complément pour le Genre *Chamaeleo*" by E.-R. Brygoo, 1978.


**STAFF**

Editor: Michael A. Dloogatch—madadder0@aol.com
Advertising Manager: Ralph Shepstone

**2012 CHS Board of Directors**

Jason Hood, President
Cindy Rampacek, Vice-President
Andy Malawy, Treasurer
Jenny Vollman, Recording Secretary
Stephanie Cappiello, Corresponding Secretary
Aaron LaForge, Publications Secretary
Mike Dloogatch, Membership Secretary
Jim Foster, Sergeant-at-arms
Josh Baity, Member-at-large
Dick Buchholz, Member-at-large
Nancy Kloskowski, Member-at-large
Linda Malawy, Member-at-large


**The Chicago Herpetological Society** is a nonprofit organization incorporated under the laws of the state of Illinois. Its purposes are education, conservation and the advancement of herpetology. Meetings are announced in this publication, and are normally held at 7:30 P.M., the last Wednesday of each month.

**Membership** in the CHS includes a subscription to the monthly *Bulletin*. Annual dues are: Individual Membership, $25.00; Family Membership, $28.00; Sustaining Membership, $50.00; Contributing Membership, $100.00; Institutional Membership, $38.00. Remittance must be made in U.S. funds. Subscribers outside the U.S. must add $12.00 for postage. Send membership dues or address changes to: Chicago Herpetological Society, Membership Secretary, 2430 N. Cannon Drive, Chicago, IL 60614.

**Manuscripts** published in the *Bulletin of the Chicago Herpetological Society* are not peer reviewed. Manuscripts should be submitted, if possible, on IBM PC-compatible or Macintosh format diskettes. Alternatively, manuscripts may be submitted in duplicate, typewritten and double spaced. Manuscripts and letters concerning editorial business should be sent to: Chicago Herpetological Society, Publications Secretary, 2430 N. Cannon Drive, Chicago, IL 60614. **Back issues** are limited but are available from the Publications Secretary for $2.50 per issue postpaid.
**Visit the CHS home page at <http://www.Chicagoherp.org>.**


**The *Bulletin of the Chicago Herpetological Society*** (ISSN 0009-3564) is published monthly by the Chicago Herpetological Society, 2430 N. Cannon Drive, Chicago IL 60614. Periodicals postage paid at Chicago IL. **Postmaster:** Send address changes to: Chicago Herpetological Society, Membership Secretary, 2430 N. Cannon Drive, Chicago IL 60614.



Copyright © 2013

*Bull. Chicago Herp. Soc. 48(8):101, 2013*

# A Danger to Snakes in the Garden

**David G. Barker**
**vpi@beecreek.net**

On the warm sunny morning of 2 May 2009, the Cibolo Nature Center in Boerne, Texas, received a call from a local woman requesting assistance with a snake problem. She had gone out to water her several raised gardens about 9 o'clock that morning, and to her surprise and dismay, she found a large snake entangled in the mesh netting that surrounded her raised garden plots. She requested that the nature center send out someone to free an "unidentified snake."

The nature center called me. I stopped whatever it was I was doing, gathered such equipment as I thought might be necessary and followed the directions that had been given. About 30 minutes later, I turned in on a long driveway to a home on several acres. When I pulled up to the house, I was met and guided back to the gardens; there entangled in the net was an adult female western coachwhip (*Coluber flagellum testaceus*). She was trussed up from head to tail, but didn't appear to be cut or damaged by the thin nylon line of the netting. She had begun to bite the netting and her mouth was forced open by multiple nylon lines around both jaws. She was one pitiful and miserable snake. The netting wasn't going to kill her outright, but in an hour she would be in full sun. She would not survive that.

Surprisingly, about six feet away was a male coachwhip, identical in size, color and pattern. He had not been there an hour earlier when the female was discovered, but apparently he had just wandered in and was now also trapped by the garden netting. He was not as entangled as the female, but he hadn't been there as long. However, he was caught; he would never have escaped; an hour later he, too, would have been in full sun.

This was my first awareness of the dangers that garden netting poses to snakes. This material, sometimes identified as mesh fencing, is an inexpensive way to protect plants in a flower bed or garden from deer predation. The netting is made of 1" squares of thin black nylon line, and comes in various heights. It doesn't cost much, and it is usually fixed at the top to metal T-posts driven into the ground around the plot. It is popular stuff, inexpensive, and it does keep deer away from the tasty plants.

Netting catches snakes most easily if the bottom of the net is not anchored. However, this is the easiest and most common way to install it. The most commonly sold mesh catches snakes with a body diameter of about an inch or a little bigger. The head of the snake has to be able to fit through the mesh. The snake crawls into it, crawls through an opening in the mesh until the mesh wedges around the body. Then when the snake senses the stricture around its body, it can't back up, and pull itself out of the single hole it has passed through because the material isn't anchored—the net, loose at the bottom, moves with the snake's struggles. The panicked snake then goes through several of the holes in the net, trying to gain purchase so that it can pull loose from the original tangle. Repeat several times, and pretty soon the snake is hopelessly caught.

If the netting is solidly anchored, it is still dangerous to a snake, but when the netting is stretched and anchored around the bottom, a snake can actually pull against the anchored mesh with a greater likelihood to get loose from the original stricture.

I cut those two coachwhips loose from the mess with a pair of fine scissors. It took me about a half-hour to get them free. Interestingly, they did not struggle or attempt to bite me while I worked to cut them loose. Once loose, I carried them about 100 yards away and released them. They never again ended up in the garden net, or so I've been told.

Prior to this experience, I was not familiar with the danger that garden mesh poses to snakes. Since then, I am aware of several Texas ratsnakes, a couple of diamondback watersnakes, and a diamondback rattlesnake that have been caught and killed by the mesh locally. I have also found a large Texas spiny lizard and a mockingbird dead in this kind of mesh. This product is very dangerous to medium-sized snakes. It is like the woven carnival prize called the Chinese finger-trap—you go in but you can't pull out. If used to protect a garden or flower bed, it should be checked several times a day.

Linda Schmeltzer

The arrows point to entrapped female (left) and male (right) coachwhips.

Linda Schmeltzer

Linda Schmeltzer

The male (above) had not been there long and was not too badly tangled. The female (below) was hopelessly snarled.

*Bull. Chicago Herp. Soc. 48(8):102-106, 2013*

# Axial Bifurcation and Duplication in Snakes. Part V. A Review of *Nerodia sipedon* Cases with a New Record from New York State

**Van Wallach**
**4 Potter Park**
**Cambridge, MA 02138**
**serpentes1@comcast.net**

**Gerard T. Salmon**
**PO Box 167**
**Boerne, TX 78006**
**gerardtsalmon@gmail.com**

## Introduction

In the most recent review of ophidian axial bifurcation, Wallach (2007) listed 950 total cases from 169 species in 93 genera. Since that time the number of known cases has increased to 850 verified cases (types 1-2) and 500 reliable reports (type 3) for a total of 1350 snakes exhibiting axial bifurcation or duplication (unpubl. data). This figure excludes 35 anecdotal reports (type 4). These records now include 191 species (which is 5% of the 3509 known species) that are allocated to 103 genera (correlating to 19% of the 539 known genera) (Wallach, Williams and Boundy, in press).

It is not surprising that *Nerodia sipedon* is one of the most frequently encountered snakes with axial bifurcation, having first been described by Linnaeus (1758) in his epic and monumental taxonomic treatise. It is not only a widely ranging species of central and eastern North America but also one of the most prolific snakes, giving birth to as many as 99 young per brood, with a mean of 23 neonates (Gibbons and Dorcas, 2004).

Smith and Pérez-Higareda (1987) proposed the following seven terms to categorize axial bifurcation in snakes: craniodichotomy, prodichotomy, proarchodichotomy, urodichotomy, opisthodichotomy, amphidichotomy, and holodichotomy. A craniodichotomous specimen has two incompletely divided heads, a single atlas* and axis*, and a single body and tail. A prodichotomous snake has two complete heads, each with an atlas and axis, either a single or two short necks, and a single body and tail. A proarchodichotomous specimen has two heads, two long necks, and a single body and tail. A urodichotomous snake has one head and body but two tails. An opisthodichotomous specimen has one head, two bodies and two tails. An amphidichotomous snake has two heads, a single body, and two tails. Holodichotomy refers to a pair of twins from a single egg, usually healthy and normal but reduced in size in comparison with their siblings.

Currently 30 documented examples of axial bifurcation in *Nerodia sipedon* are known. The 24 published cases are summarized below in chronological order of their discovery, followed by six unpublished records. A new individual is then described from New York State. Collection acronyms include ANSP (Academy of Natural Sciences of Philadelphia, Philadelphia, PA), CA (Chicago Academy of Sciences, Chicago, IL), GNHL (Grove National Historic Landmark, Glenview, IL), MCZ (Museum of Comparative Zoology, Cambridge, MA), USNM (National Museum of Natural History, Washington, DC), and VWABC (Van Wallach Axial Bifurcation Collection, Cambridge, MA).

## Published records

1) The first discovered dicephalic *Nerodia sipedon* came from Shirley, Middlesex County, Massachusetts, and was collected in August 1763 by Captain William Baker. Among the brood of 60 young from a dead gravid female was a 300 mm stillborn specimen with two heads (Anonymous, 1795, 1796). This particular embryo, as a single dicephalic within a litter of 60 normal young, disproved a popular belief that dicephalic snakes represented a separate and valid species (Dareste, 1891) and that a two-headed mother would give birth only to dicephalic young (Anonymous, 1919a).

2) Wyman (1863) reported on and figured an amphidichotomous specimen with two heads and two tails and variously measured between 152 and 178 mm in length collected by Mr. Wells from the Boston vicinity, Suffolk County, Massachusetts. It was deposited in the Massachusetts State Collection under C. L. Flint but later reportedly transferred to the MCZ. However, this snake, refigured by Cunningham (1937: pl. 12, fig. 130), can no longer be found.

3) A dicephalic specimen of *Nerodia sipedon* was described and reported from North America (Anonymous, 1865).

4) The next two specimens were reported from Ohio, the first one, without specific locality data (Anonymous, 1873), was cited by Rothschild et al. (2012).

5) The second case occurred in August 1883 when B. B. Banks collected a 200 mm neonate *N. sipedon* in the reservoir at Antwerp, Paulding County, Ohio, displayed it at the newspaper office in Fort Wayne, Indiana, and proposed selling it to P. T. Barnum the following Saturday (Anonymous, 1883). The St. Louis Museum offered to buy it but its final destination cannot be determined.

6) The next dicephalic *N. sipedon* was an adult prodichotomous specimen, supposedly 1500 mm long, collected by Captain Leo Heit, at the Cut Off three miles below Galena, Jo Daviess County, Illinois, in July 1890, representing the first Illinois record (Anonymous, 1890).

7) A third presumably Massachusetts *Nerodia sipedon* was obtained by N. L. Wilson and described by Johnson (1902: pl. 38, fig. 13) as Case XIII. It is a 177 mm craniodichotomous embryo that was deposited in the University of Wisconsin Anatomical Laboratory.

8) Outram Bangs collected a craniodichotomous specimen in Stoneham, Middlesex County, Massachusetts, making it the fourth specimen from that state (Johnson, 1902).

---

* In anatomy, the *atlas* is the first vertebra of the spine, so named because in a human being it supports the globe of the head. The *axis* is the second vertebra. The atlas and axis are specialized to allow a greater range of motion than normal vertebrae.

9) A 203 mm, no locality data, prodichotomous *N. sipedon* in the collection of the Chicago Academy of Sciences (CA 288) was first figured and reported in October 1919 (Anonymous, 1919a) and redescribed by Cunningham (1937: pl. 7, figs. 79-80). Originally identified as *Nerodia fasciata* it was reidentified as *N. sipedon* by Payen (1991).

10) Another record from 1919 and the first from Pennsylvania originated in Waynesboro, Franklin County, Pennsylvania, when a dead gravid female containing 25 embryos was examined on 24 September by S. H. Fitz and found to include a prodichotomous individual (Anonymous, 1919b).

11) Fowler (1922) listed a dicephalic *N. sipedon* from an unspecified locality in Maryland, collected by G. W. Sullivan and deposited in the Philadelphia museum (ANSP 9791) but the specimen was discarded in 1941.

12) A second Pennsylvania record originated from another dead gravid female, examined by I. H. Marshall, from the vicinity of Coraopolis, Allegheny County, Pennsylvania. It contained a craniodichotomous embryo within a brood of 28 *N. sipedon* (Hyde, 1925). A photograph and x-ray of the specimen were provided by Hyde and reproduced by Cunningham (1937: pl. 2, figs. 26-27) and Curran and Kauffeld (1937: fig. 48). The original identification of the snake as a copperhead, *Agkistrodon mokasen*, was in error and corrected by C. H. Pope in Cunningham (1937).

13) A third Ohio specimen, a 178 mm neonate from Big Darby Creek near Columbus, in Franklin County, collected by O. C. Clemmons on 13 September 1925, was subsequently reported and illustrated by Billy Ireland (Anonymous, 1925).

14) Amaral (1927: pl. 3, fig. 4) described and illustrated a 192 mm prodichotomous *N. sipedon* from Johnson County, Kentucky, that is in the National Museum (USNM 38045). Its photograph was reproduced by Cunningham (1937: pl. 8, fig. 93).

15) A 165–173 mm craniodichotomous individual that was born in captivity at the New York Zoological Gardens and donated to T. Barbour at the MCZ on 28 March 1906 (MCZ 7043) was also described and illustrated by Amaral (1927: pl. 3, fig. 5) and Cunningham (1937: pl. 8, fig. 94).

16) A dicephalic *Nerodia sipedon* collected in Quincy, Adams County, Illinois, in August 1935 by Russell Kealen represents the second Illinois record (Anonymous, 1935). The neonate was estimated to be one month old by W. W. Minear, the local high school biology teacher.

17) The second New York record was a craniodichotomous neonate with only three eyes that was found near Lake Sebago, Rockland County, New York in the fall of 1921 by "Van, the Snake Man," and it survived for 28 days (Cunningham, 1937).

18) A dicephalic specimen from Macon, Bibb County, Georgia, the first for that state, was collected by an African-American in 1935 and when the biologist E. E. Byrd attempted to buy it the price was too high so it was lost to the scientific community (Byrd, 1939).

19) The first Canadian record of axial bifurcation in *Nerodia sipedon* comes from a marsh near Rossmore, Ontario. It was collected by Dennis Day and photographed for the newspaper (Anonymous, 1956). The snake died shortly thereafter and was preserved.

20) Paul Krantz collected the third Pennsylvania specimen, a 272 mm craniodichotomous *N. sipedon* from Conestoga Creek near Sunnyside, Lancaster County, Pennsylvania (Ernst, 1960).

21) A highway maintenance crew near Franklin, Heard County, Georgia, dug up a gravid female containing a 250 mm craniodichotomous embryo, the second Georgia record (Anonymous, 1965).

22) The most famous dicephalic *Nerodia sipedon* was collected by Dan and Tad Abston in 1980 in Campbell's Creek near Charleston, Charleston County, West Virginia (Anonymous, 1980). This prodichotomous specimen was purchased by Bill Haast for $50.00 and it lived for at least four years as a star attraction in the Miami Serpentarium in Florida under the name of "Hatfield & McCoy." The left head was dominant but both heads fed. As a neonate it was 150 mm long but it grew to a length of 950 mm after three years (Wood, 1983). Coincidentally, GTS worked at the Miami Serpentarium from 1980 through 1982 and was familiar with this snake.

23) A third Illinois specimen was collected by Stephan Swanson from Gorham, Jackson County, Illinois and the report was illustrated with four figures (Swanson et al., 1997). It is a 218 mm opisthodichotomous *Nerodia sipedon pleuralis* with an apparently single head and body with two tails. However, an x-ray shows two complete vertebral columns independently attached to a partially divided skull (GNHL GR 1995-1).

24) Two Hoover Elementary School boys in Iowa City, Johnson County, Iowa, found a prodichotomous specimen on 5 October 2007 (Williamson, 2007).

**Unpublished records**

25) In 1917 G. W. Sullivan collected a 148 mm craniodichotomous individual at Preston, Vigo County, Indiana, now deposited in Philadelphia (ANSP 21540).

26) A dried and mounted 190 mm craniodichotomous *N. sipedon pleuralis* that was collected in 1965 in Heard County, Georgia, and survived only one day is on display in Room 431 or 432 of the Georgia State Museum of Science and Industry in the State Capitol building in Atlanta.

27) A craniodichotomous *N. sipedon* from Chester County, South Carolina, was collected by Jim King; it lived only a few days and is now a dried specimen in Exhibit #99 in Ripley's Believe It or Not Museum, Pattaya, Thailand.

28) Cheryl Ankney collected a craniodichotomous *N. sipedon pleuralis* near Olean, Ripley County, Indiana, in August–September 2011. It was donated to Sarabeth Klueh-Mundy of the Indiana Division of Fish and Wildlife.

29-30) One craniodicephalic *Nerodia sipedon* is owned by James and Bonnie Arnold of Texas and another by Terry Lilley of Central Coast Reptile Research Center in San Luis Obispo, San Luis Obispo County, California.

**Figure 1**. Author (GTS) holding recently captured *Nerodia sipedon* (first photo of Iggy & Ziggy). Photograph by Gerry Salmon.

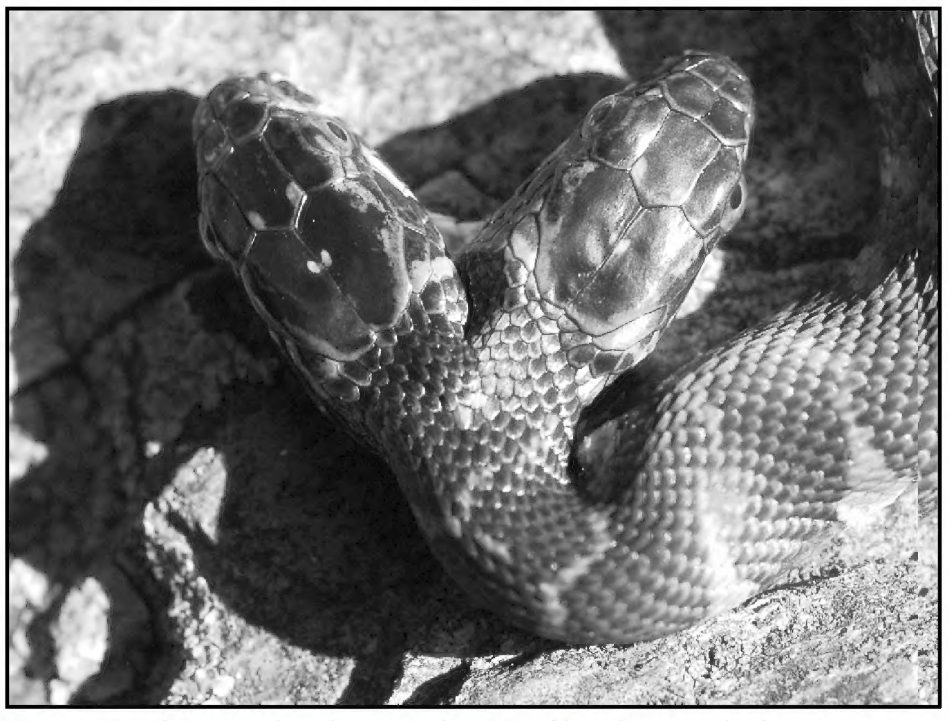


**Figure 2**. Close-up showing attachment of heads posteriorly. Photograph by Van Wallach.

**Figure 3**. Iggy & Ziggy posed next to a penny. Photograph by Van Wallach.

**Figure 4**. Iggy & Ziggy with a typical prey minnow. Photograph by Van Wallach.

**Figure 5**. Dorsal view of Iggy & Ziggy after death. Photograph by Van Wallach.

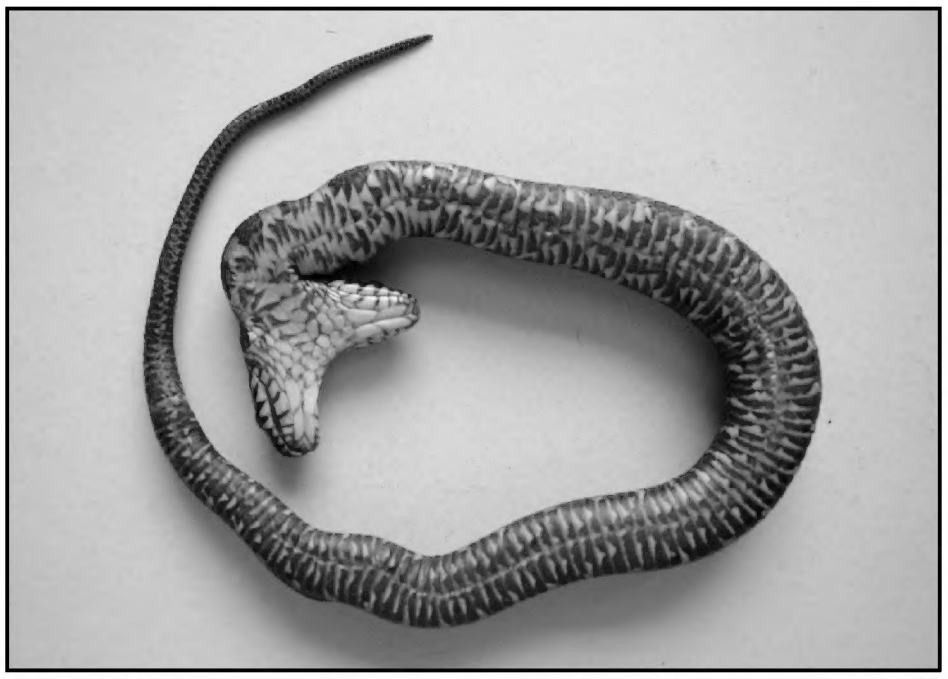


**Figure 6**. Ventral view of Iggy & Ziggy after death. Photograph by Van Wallach.

## New record

On 23 September 2009 GTS received a neonate *Nerodia s. sipedon* that was collected on Honeywell Lane in the town of Hyde Park, Dutchess County, New York (Figure 1). As it was in the process of its first shed, the birth date is estimated to have been between 10–13 September. The snake is craniodichotomous as the heads are not completely separated but joined posterior to the supralabials with the heads at 90° angles to each other (Figure 2). It suffered through some early ordeals as it was initially discovered by Don Burns after he ran over it with a lawnmower (at which time a sibling was killed). Don captured it and, knowing that GTS was an avid snake enthusiast, placed it in the cab of a pickup truck on a hot day while transporting it to GTS. Fortunately, the snake did not succumb to overheating. GTS cared for the snake, helping it with its first ecdysis, and offered various fish and salamanders to it as food items, which it apparently refused.

GTS donated it to VW on 1 October 2009, at which time its length and weight were 185 mm and 4.0 g. The snake was named "Iggy & Ziggy" (Figure 3). It proceeded to eat small minnows on a nearly daily schedule (Figure 4). The snake was never force-fed but once a minnow was placed in its mouth it would swallow the fish it on its own. Both heads could feed but the snake was left head dominant (left head was mainly in line with the body axis) and during its lifetime (between 2 October and 31 December) the left head consumed 70 fish, the right head only one (and once the right head spit out a minnow offered to it). After the first day, when both heads feebly tried to drink water, only the right head was observed to drink. It died on 1 January 2010 of unknown causes (Figures 5 and 6). "Iggy & Ziggy" survived 3.5 months and grew to a length of 217 mm (17% increase in length) and weight of 7.5 gm (88% increase in weight). It never shed its skin a second time, which might be a factor in its mortality. It was preserved after it died for later study of its viscera and osteology (VWABC 15).

## Conclusions

This report documents the 31st case of axial bifurcation in *Nerodia sipedon* and the third case from New York State, all of which are craniodichotomous in nature. Among the 31 individuals of *N. sipedon*, the bifurcation type is known in only 21 of them. Statistics reveal that frequencies of the bifurcation types in all snakes ($n$ = 730) are approximately 65% with prodichotomy, 30% with craniodichotomy, 3% with amphidichotomy, 2% with opisthodichotomy, and only 1% with urodichotomy (unpubl. data). However, with the current sample ($n$ = 21) of *Nerodia sipedon*, the frequencies are skewed toward incomplete division of the head with 67% craniodichotomous ($n$ = 14), 24% prodichotomous ($n$ = 5), 5% amphidichotomous ($n$ = 1), and 5% opisthodichotomous ($n$ = 1). Craniodichotomy is present in all three specimens from New York and two each from Georgia, Indiana, Massachusetts, and Pennsylvania. Frequency of occurrence by state is four from Massachusetts, three each from Georgia, Illinois, New York, Ohio and Pennsylvania, two from Indiana, and one each from Iowa, Kentucky, Maryland, South Carolina, West Virginia, Canada and North America, with three of unknown provenance. The total number of voucher specimens of this species currently held in scientific collections is ten.

## Acknowledgments

VW wishes to thank everyone who has donated specimens, submitted photographs, and provided literature or reports on dicephalic snakes—past, present and future. Special thanks go to David Barker, who suggested that VW would be interested in the snake for study, and to GTS for donating and delivering the specimen. Any and all information on axial bifurcation in snakes is most welcome, appreciated, recorded and eventually analyzed and studied.

## Literature Cited

Amaral, A. do. 1927. Bicephalia em ophidios. Revista do Museu Paulista, São Paulo 15:95-101, 6 pls.

Anonymous. 1795. The two-headed snake. The Rural Magazine, Rutland, VT (1 November):563.

————. 1796. Natural history: The two-headed snake. The Rutland Herald (21 March), 2(12):4.

————. 1865. Zweiköpfige Schlangen. Das Ausland: Leberschau der neuesten Forschungen auf dem Gebiete der Natur-, Erd- und Völkerkunde, Augsburg 38(31):744.

————. 1873. A two-headed snake. Cleveland Daily Record (27 October):2. [not seen]

————. 1883. A snake story. And a good and true one—an editor brings a snake with two heads to the "Gazette" office. Fort Wayne Daily Gazette (5 September):1.

————. 1890. A two-headed moccasin. Chicago Daily Tribune (19 July):12.

————. 1919a. Why does nature do it? The Popular Science Monthly 97(1):59, 1 fig.

————. 1919b. Angler discovers snake with two distinct heads. El Paso Herald (24 September):11.

————. 1925. Reptile with more than one head existing. Lima Sunday News (20 September):1.

————. 1935. Snake with two heads is found. The Evening Tribune, Albert Lea, MN (27 September):2.

————. 1956. Two-headed snake. Winnipeg Free Press (17 September):23, 2 figs.

————. 1965. Two heads better than one? Newspaper unknown (1 December).

————. 1980. Two heads are . . . The Los Angeles Times (9 October):10, 1 fig.

Byrd, E. E. 1939. Certain aspects of the anatomy of a two-headed turtle. Journal of the Tennessee Academy of Science 14(1):102-109. [reprinted in Report of the Reelfoot Lake Biological Station 23:102-109]

Cunningham, B. 1937. Axial bifurcation in serpents: An historical survey of serpent monsters having part of the axial skeleton duplicated. Durham: Duke University Press, 91 pp, 12 pls.

Curran, C. H., and C. Kauffeld. 1937. Snakes and their ways. New York: Harper & Brothers.

Dareste, C. 1891. Recherches sur la production artificielle des monstruosités ou essais de tératogénie expérimentale. Paris: C. Reinwald et Cie. 590 pp.

Ernst, C. H. 1960. Dichocephaly in a northern water snake. Bulletin of the Philadelphia Herpetological Society 8(5):17.

Fowler, H. W. 1922. Additions to the museum, 1921. Annual Report of the Academy of Natural Sciences of Philadelphia 11:48-54.

Gibbons, J. W., and M. E. Dorcas. 2004. North American watersnakes: A natural history. Norman: University of Oklahoma Press.

Hyde, B. T. B. 1925. Two-headed snakes; a not uncommon phenomenon of the reptile world. Natural History 25(2):184-187, 2 figs.

Johnson, R. H. 1902. Axial bifurcation in snakes. Transactions of the Wisconsin Academy of Sciences, Arts and Letters (1901) 13(2): 523-538, 8 pls.

Linnaeus, C. 1758. Systemae naturae per regna tria naturae, secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis. Tomus I. Editio decima. Reformata. Holmiae: Laurentii Salvii. 824 pp.

Payen, S. B. 1991. Teratologie chez les reptiles. Étude particulière des monsters à bifurcation axiale. Inventaire des exemplaires conserves dans les museums d'histoire naturelle. Doctoral thesis, Ecole Nationale Veterinaire d'Alfort, Paris. 175 pp., 6 pls.

Rothschild, B., H.-P. Schultze and R. Pelligrini. 2012. Herpetological osteopathology: Annotated bibliography of amphibians and reptiles. New York: Springer. 450 pp.

Smith, H. M., and G. Pérez-Higareda. 1987. The literature on somatodichotomy in snakes. Bull. Maryland Herp. Soc. 23(4):139-153.

Swanson, S., F. van Breukelen, B. Kreiser, D. Chiszar and H. M. Smith. 1997. A double-bodied midland water snake and additions to the literature on ophidian axial bifurcation. Bull. Chicago Herp. Soc. 32(4):80-83, figs. 1-4.

Wallach, V. 2007. Axial bifurcation and duplication in snakes. Part I. A synopsis of authentic and anecdotal cases. Bull. Maryland Herp. Soc. 43(2):57-95.

Wallach, V., K. L. Williams and J. Boundy. In press. Snakes of the world: A catalogue of living and extinct species. Boca Raton, Florida: CRC Press.

Williamson, D. 2007. Local kids find 2-headed snake . Iowa City Press-Citizen (5 October):A-1.

Wood, B. 1983. Two-headed snake has split personality. Kansas Herpetological Society Newsletter (54):11. [reprinted from Lawrence Journal-World, 13 Sept. 1983]

Wyman, J. 1863. Two specimens of monstrosity in serpents. Proceedings of the Boston Society of Natural History 9:193-196, 1 fig.

*Bull. Chicago Herp. Soc. 48(8):107-108, 2013*

# Notes on Reproduction of Orange-throated Whiptail Lizards, *Aspidoscelis hyperythra* (Squamata: Teiidae), from California

**Stephen R. Goldberg**
**Biology Department, Whittier College**
**PO Box 634**
**Whittier, CA 90608**
**sgoldberg@whittier.edu**

**Abstract**

The reproductive cycle of *Aspidoscelis hyperythra* from Riverside County, California, was examined utilizing a histological examination of museum specimens. Reproductive activity commenced in March in males and May in females. Mean clutch size ($n$ = 3) was 2.33 ± 0.58, range = 2–3. The smallest reproductively active male and female measured 50 and 58 mm SVL, respectively. My findings indicate reproduction of *A. hyperythra* in California begins earlier than previously reported. Also, the reproductive cycle of *A. hyperythra* extends later into the summer in Baja California Sur, Mexico, than in southern California.

*Aspidoscelis hyperythra* ranges from coastal southern California, south to the Cape region of Baja California Sur, Mexico (Stebbins and McGinnis, 2012). There are two detailed reports on its reproductive cycle: (1) from San Diego County, California (Bostic, 1966), and (2) Baja California Sur (Romero-Schmidt and Ortega-Rubio, 2000). Anecdotal information on *A. hyperythra* reproduction is in Smith (1946), Asplund (1967), Stebbins (1954, 2003), Behler and King (1979), Karasov and Anderson (1984), Grismer (2002), Stebbins and McGinnis (2012). The purpose of this note is to provide information on the reproductive cycle of *A. hyperythra* from Riverside County, California. Information is presented that *A. hyperythra* reproduction starts earlier in the year in California than previously published. Comparisons are made between the timing of the reproductive cycle of *A. hyperythra* from California versus Baja California Sur.

## Methods

A sample of 45 *A. hyperythra beldingi* was examined, consisting of 27 males (mean SVL = 58.5 mm ± 5.1 SD, range = 50–68 mm), 17 females (mean SVL = 61.5 mm ± 5.1 SD, range = 53–70 mm) and one juvenile female (SVL = 52 mm) collected in Riverside County, California, 1930–1972, and deposited in the herpetology collection of the Natural History Museum of Los Angeles County (LACM), Los Angeles, California (see Appendix).

A small incision was made in the lower part of the abdomen and the left gonad was removed for histological examination. Oviductal eggs were counted, no histology was performed on them. Gonads were embedded in paraffin, sections were cut at 5µm, and stained with Harris hematoxylin followed by eosin counterstain (Presnell and Schreibman, 1997). Histology slides were deposited in LACM. An unpaired t-test was used to test for differences between male and female body sizes (SVL) using Instat 3.0. (Graphpad, San Diego, CA).

## Results

There was no significant difference between mean body sizes of male and female samples (unpaired $t$-test, $t$ = 1.7, $df$ = 42, $P$ = 0.10). The only stage observed in the testicular cycle was spermiogenesis (sperm formation) in which the lumina of the seminiferous tubules were lined by clusters of sperm or metamorphosing spermatids. Spermiogenesis was present in the following monthly male samples: March ($N$ = 1), April ($N$ = 11), May ($N$ = 9), June ($N$ = 4), July ($N$ = 2). Males may commence breeding in March. The smallest reproductively active male (spermiogenesis in progress) measured 50 mm SVL (LACM 99863) and was collected in March.

Monthly stages in the ovarian cycle of *A. hyperythra* from Riverside County, California, are in Table 1. Three stages were present: (1) Quiescent, no yolk deposition; (2) Early yolk deposition, basophilic yolk granules present in ooplasm; (3) Oviductal eggs. One *A. hyperythra* female each from May and June with quiescent ovaries also contained corpora lutea from a recently deposited egg clutch, indicating oviposition occurs during May and June in Riverside County, California. The smallest reproductively active female (LACM 99880) measured 58 mm SVL, contained oviductal eggs and was collected in May. I considered females that measured 53 mm SVL (LACM 53326), 54 mm SVL (LACM 99859) and 55 mm SVL (LACM 99873) as adults in view of Bostic (1966) who reported *A. hyperythra* females from San Diego County were mature at 53 mm SVL. One female collected in April (LACM 150805) with quiescent ovaries measured 52 mm SVL and was considered to be a juvenile. Mean clutch size for my study ($n$ = 3) was 2.33 ± 0.58, range = 2–3. This is identical to the value reported by Bostic (1966) for San Diego County.

**Table 1**. Monthly stages in the ovarian cycle of 17 *A. hyperythra* from Riverside County, California.

| Month | *n* | Quiescent | Early yolk deposition | Oviductal eggs |
|---|---|---|---|---|
| April | 4 | 4 | 0 | 0 |
| May | 9 | 6* | 1 | 2 |
| June | 3 | 2* | 0 | 1 |
| July | 1 | 0 | 1 | 0 |

* one female each from May and June with quiescent ovaries also contained corpora lutea from a recently deposited egg clutch.

## Discussion

Female *A. hyperythra* commenced reproductive activity in May (Table 1) as indicated by the presence of oviductal eggs in two females, and corpora lutea but no eggs, indicating a recent oviposition in one female. This differs from Bostic (1966) who reported *A. hyperythra* oviposition commenced in late June. Also, *A. hyperythra* males enter breeding condition (spermiogenesis) in March as opposed to April (Bostic, 1966). It is questionable if the enlarged ovarian follicles (5 mm) from August and September reported by Bostic (1966) would have completed development as his latest report of oviductal eggs was in July. Incidences of follicular atresia (spontaneous degeneration) of vitellogenic follicles increase late in the reproductive season when follicles that failed to complete yolk deposition, degenerate (Goldberg, 1973, 1975). While the number of clutches produced per reproductive season by *A. hyperythra* is not known, Bostic (1966) suggested older lizards could lay two clutches. In view of my finding of a corpus luteum in one May female, indicating a clutch had already been deposited and yolk deposition in one July female for a subsequent clutch (Table 1), it would appear production of two clutches was feasible for some *A. hyperythra* females.

*Aspidoscelis hyperythra* exhibits a longer period of reproduction in Baja California Sur as the female reproductive season peaked in August when all females contained oviductal eggs (Romero-Schmidt and Ortega-Rubio, 2000). This was supported by Asplund (1967) who found oviductal eggs and enlarged testes in August, Karasov and Anderson (1984) who reported vitellogenesis, oviductal eggs and corpora lutea in August and September and Grismer (2002) who observed *A. hyperythra* hatchlings in late September.


## Acknowledgment

I thank G. Pauly (LACM) for permission to examine *A. hyperythra.*


## Literature Cited


Asplund, K. K. 1967. Ecology of lizards in the relictual Cape flora, Baja California. American Midland Naturalist 77(2):462-475.

Behler, J. L., and F. W. King. 1979. National Audubon Society field guide to North American reptiles and amphibians. New York: Alfred A. Knopf.

Bostic, D. L. 1966. A preliminary report of reproduction in the teiid lizard, *Cnemidophorus hyperythrus beldingi*. Herpetologica 22(2): 81-90.

Goldberg, S. R. 1973. Ovarian cycle of the western fence lizard, *Sceloporus occidentalis*. Herpetologica 29(3):284-289.

————. 1975. Reproduction in the sagebrush lizard, *Sceloporus graciosus*. American Midland Naturalist 93(1):177-187.

Grismer, L. L. 2002. Amphibians and reptiles of Baja California including its Pacific Islands and the islands in the Sea of Cortés. Berkeley: University of California Press.

Karasov, W. H., and R. A. Anderson. 1984. Interhabitat differences in energy acquisition and expenditure in a lizard. Ecology 65(1): 235-247.

Presnell, J. K., and M. P. Schreibman. 1997. Humason's animal tissue techniques, 5th Ed. Baltimore: The Johns Hopkins University Press.

Romero-Schmidt, H. L., and A. Ortega-Rubio. 2000. Reproduction of the Cape orange-throat whiptail, *Cnemidophorus hyperythrus hyperythrus*. Herpetological Natural History 7(1):1-7.

Smith, H. M. 1946. Handbook of lizards: Lizards of the United States and of Canada. Ithaca, New York: Comstock Publishing Associates.

Stebbins, R. C. 1954. Amphibians and reptiles of western North Americas. New York: McGraw-Hill Book Company.

————. 2003. A field guide to western reptiles and amphibians. Boston: Houghton-Mifflin.

Stebbins, R. C., and S. McGinnis. 2012. Field guide to amphibians and reptiles of California, Revised edit. Berkeley: University of California Press.


## Appendix

*Aspidoscelis hyperythra* from Riverside County, California, examined from the herpetology collection of the Natural History Museum of Los Angeles County (LACM).
LACM: 7758-7760, 14749, 53325-53329, 99852-99856, 99859, 99860, 99862-99864, 99866-99870, 99872-99876, 99879, 99880, 115683-115686, 123435-123437, 137860, 137861, 150800, 150802,150804-150806.

*Bull. Chicago Herp. Soc. 48(8):109-110, 2013*

*In fond remembrance of Ilene Sievert, who died December 16, 2012, this year we will reprint several of the essays that Ilene wrote for these pages between 1988 and 1993 under the rubric "Frog City." This one is from January 1991.*

# Frog City
# by Ilene Sievert

## VIII. An All-American Toad

Once upon a time the family of my husband's sister lived in a suburb yclept Glendale Heights. Owing and owing to a temporary cash flow problem, their home perforce was modest and in a less prestigious part of town. The little house had been degraded by improvements and thriftily priced. How the previous owners must have loved one-inch ceramic tiles, for they embellished most flat and rectangular surfaces, inside and out, in various colors of the little squares. The protruding masonry of the foundation was painted a crisp white contrast to both brick and black soil. They had painted the exterior trim in the brilliant turquoise usually reserved for public swimming pools and though Donna repainted in brown, peacock drips and slopovers still winked from stone ledges and concrete walks. In an unusual floor plan, a large bathroom, well-tiled, served as a corridor both to basement and living room.

The small yard, furnished out with turfgrass and common shrubs, was somewhat damp because at the rear an abrupt rise to the neighbor's level brought rain in a waterfall rush towards the foundations. Impounded between hill and house, the waters gathered and moisture persisted.

My brother-in-law is not a house-handy man, but he does mow the lawn. I heard him lamenting the task one evening at a family gathering.

"There are so many toads," he complained, "that I cannot avoid mangling some in the mower every time I cut grass."

"Do you really have toads in your yard?" I eagerly asked.

"We have incredible numbers of them. They're in the window wells and last week we found a whole family, dead, in the dryer vent."

I puzzled over this a long moment, then asked, "What do you mean—a whole family?"

"Oh, you know, a mother, a father, and three young ones."

"Just how could you tell which toad was the mother, which the father or children?"

"Well, of course, I went by size; the father largest, and so on."

"Of course," and of course we had a short course of instruction on the life cycle of amphibians and the quality of their nuclear family relationships. He did recall to himself somewhat of frog tadpoles and did toads do that too? Fortunately the man is gracious. Although he suffered a lecture on toad reproduction he did not reciprocate and explain golf to me.

In all of my childhood in the Albany Park–Ravenswood area nary an amphibian had appeared in our yard or environs. This despite proximity to that pristine stream, the North Branch of the Chicago River. Many an hour I gazed into its perfumed waters looking for turtles, frogs, fish; all those creatures that inhabited rivers of my books. The only aquatic life I found was in small overflow pools of a narrow cement-lined channel leading to the North Branch near River Park. All invertebrates, they were netted up into jars and taken home for identification. Anything that made little jumps in the water I called "daphnia." Anything long and wavy was "worm"; big and nasty with legs, "dragonfly larva." I identified mosquito larvae by patient observation of life cycle and gave scientific stimulation to my entire family.

The terrestrial wildlife was unmistakably *Rattus*. They quickly scurried from my footsteps except for one so dead it was alive with maggots. The skin waved and rippled. I knelt down and bent over for a closer look at this highly interesting phenomenon. I had never previously been very close to rat, maggot, or advanced putrefaction. The potency of odor was a nasty surprise and henceforward the phrase "food for worms" had a primarily olfactory memory association. Other children said there were snakes in the long grass but they could never show any to me. I suspected the story was invented to deter or frighten, both fashionable activities for little boys in that sexist era. In my green ignorance I had no idea how secretive and shy snakes are and perhaps they were there.

How I longed to see a non-rat hop, jump, slither, or splash. Youth was spent without ever seeing a live toad; only knowing the mythical animal that was poisonous, gave warts, had a magical jewel in its head, and was an archetype of evil ugliness.

So you may imagine with what delight I heard of the amphib-

ian riches of Glendale Heights. I longed to go on safari to the darkest dampest western suburbs and behold the magnificent untamed wild toads prowling their native habitat: unfettered and free they roam the wet grass, defying dogs, mowers, and brats in search of prey. The toads in search of prey, that is.

We visited again late the following Spring. There were no toads in the grass, even at night. "There's a lot fewer of them this year," said my brother-in-law. "In fact, I haven't seen any."

The summer came and he still hadn't seen any when mowing but his little son had caught a few and released them. Mom preferred no toads indoors and what would you feed them anyway? Bugs in the house! Another brother-in-law with good rural toad hunting experience promised to find one for me. He led me to the dark space behind the garage where some old planks had been long lying on black mud. We lifted a few boards and there he was; big, fat, warty and black as the mud; swollen up with surprise and glaring with helpless hostility. We put him in a big jar with a little water and a ventilated lid, and after all the kids had a chance to say eeyew a toad, he was put in a shady outdoor place. Outdoors for kindness and privacy, yes, but also because he had a peculiar musky odor resembling Spring skunk.

We assumed the blackness was mud which a few soaks would remove along with the wild odor. Although shadowy markings appeared he remained very dark and so he was named "Blackie" after a late lamented dog of the same name. The smell decreased in quantity but the quality remains the same. To perceive it one must bring one's nose closer than Blackie finds socially comfortable.

Blackie is an attractive animal, even amongst toads. His dark polished warts have a lovely semiconical shape, an almost pointed appearance, resembling the business end of an Hawaiian war club. We feel the asymmetry of warts and wart groups is very artistic, providing a sophisticated counterpoint to spherical motifs of body shape. On his turreted eyelids complexity of configurations resembles a Nevelson sculpture, bits of wood painted black. His glaring scowling face is an antique African mask of dark textured hide. Staring stillness enhances a fetish-like appearance, commanding awe by insistent Presence, a sort of Sacred Heart of Darkness. The spell is broken if he hops. This form of locomotion does not seem dignified to humans, though oddly enough, a goosestep does impress some folks.

Blackie ate well and adapted to captivity on newspaper with a big heavy dog dish of water and a broken flower pot for privacy. In this manner he lived for a year. He did not learn to cease starting when there was a sudden movement in the room. He would hop into the wall of his plastic cage and squeak his body trying to climb out, kicking his hide pot around until it was in a useless position. An experience with another toad caused us to rethink Blackie's case. We brought home from a camping trip in West Virginia a large yellow clay-colored male. He climbed incessantly against his cage, ate poorly, and died, presumably of stress. Blackie's behavior was less severe, but one must also consider long term effects. Not only did he push around the shelter so it could not be entered, his wet body moistened the newspaper so it tore and clung in bits to his skin and floated in the water dish. Then his body sat flatly on the smooth airless plastic. I didn't like the look of it. Meditating on the problem, I was inspired by a scrap of Scripture, "Dust thou art and unto dust shalt thou return." A cage was made up with a couple of inches of clean potting soil. The water dish went on one end and a short spreading plant in a plastic pot on the other. He dug himself a sitting pit and though not covered he feels and looks invisible. The plant reminds me to moisten the soil occasionally when I replace his dish of dirty water with a new dish of clean. Now when I change water or add food, instead of jumping away he hunkers down into his pit. His dirty water always has soil from the substrate in it, but we can't tell whether it was clinging to his skin or passed through his digestive tract since he eliminates in the soak. Sometimes there is a dark "toad glove" floating in the dish. If he is disturbed naked in the tub he modestly hops out into his robe of earth. We literally do a cage change. We prepare a clean cage with fresh potting soil, water dish and plant and pop him into it before he's figured it out. The soil goes to the garden, the plant for a bath and vacation, the rinsed dish to the dishwasher, and the cage to be soaked in bleach solution and then plain water.

Blackie has a valuable talent—an accurate and effective strike. It is a pleasure to see him pick off individuals in a disparate-moving crowd of insects. He makes jerky adjustments in position as necessary to emplace his cannon, with eye-popping gulps for recoil. If given insects in a glass bowl he will strike and strike fruitlessly against the glass until prodded or guided into the dish. Evidence of his golden eyes overrides touch of tongue.

Because he is so undiscriminating in his diet, poor Blackie is the garbage can of metamorphosed mealworms. We try to compensate with a dessert of fat nightcrawler. Slime picks up unpalatable lumps of soil so he combs the worms clean with his fingers as they are wrestled down his gullet. This looks like the only exercise he volunteers to do except for climbing in and out of the water dish. Surely he writhes in the shedding dance, but so secretively, it's never been spied out.

Common American toads like Blackie, common as dirt you say, are not easily found now in that western town. The drainage, perhaps, has been improved, the mosquitos abated, the weeds and brush cleared, the bluegrass lawn mowed and treated for pests, the roses sprayed. The children will be as toadless as those of Albany Park in their green and blooming deserts.

Shall we fight this terrible impoverishment, or will these unique creatures find their only significance as storybook puppets or icons of metaphor? Shall she embroider the crane on her wedding kimono and never care if the living bird dances? Shall he carve frogs on his drumstool to charm fecundity yet care not if the ponds teem? Shall the raven dwell only on Odin's shoulders or steal the moon on a totem pole while northern forests are emptied? It is all possible if we do not have toads emerging from under the damp boards, between the shady stones, near the porch light to snap up night bugs with invisible flicks of tongue, swift graceful flicks from a slow fat body. Consider no big round toads puffed out on tip-toe, no tiny toads like black peas with thin legs, no black water commas risking rescue by children from their shallow pools, no sticky strings of twitching dots. Our own springs will dry up. There must be secret creatures hiding in the earth for us, and the king of them all is Toad.

*Bull. Chicago Herp. Soc. 48(8):111-112, 2013*

# What You Missed at the July Meeting

**John Archer**
**j-archer@sbcglobal.net**

This month I really wanted to use a word that I'm pretty sure would not get by the editor. A word that probably has no place in a publication such as the *Bulletin*. I have lots of clever thoughts that involve this word but don't quite come across when using its substitutes. Being of limited imagination, I doubt if I could have presented an informative and interesting talk about the subject without using that word, but our July speaker had no trouble at all talking about excrement. Using words such as poop, scat, and feces, Erica Mede managed to provide a humorous but valuable look into the world of animal waste. No small challenge that, but for someone who confesses to spending 60% of her workday looking at excreta, she sailed through the subject manner including pictures that didn't quite reach the totally disgusting level. Who knew that poop could be so fascinating?

Erica Mede. Photograph by Dick Buchholz.

Well, Erica Mede, for one. Here's the summary from the speakers section of the CHS web site:

> The Good, the Bad, and the Ugly of Poop will leave you breathless (and not from the smell) and unable to look away from your reptile's feces again! Here you will learn about the Good (the beneficial flora and fauna of scat), the Bad (the nasties that lurk in your reptile's colon including parasites and signs of disease), and the Ugly (the differences between normal and abnormal dung). The TV show *Scrubs* puts it best, "it all comes down to poop."
>
> Erica is a certified veterinary technician (CVT) from Chicago Exotics Animal Hospital and the president and founder of Friends of Scales Reptile Rescue. Her deep seated love for reptiles started when she was a little girl at the Lincoln Park Zoo, where she spent more time watching garter snakes in the small gardens than looking at the animals on display. Now she works towards her AVTCP Exotic and Avian specialization. Erica is currently the Technician Liaison for the Association of Reptilian and Amphibian Veterinarians (ARAV because that's a mouthful) where she has utilized the rules of Zombieland for her presentation and helps with the CHS Jr. Herper meetings too (not with zombie talk). She currently enjoys sharing her home with a pitbull named Harley Quinn whose greatest joy in life is hiding pig ears under Erica's pillow and her mini-reptile collection all with similarly epic names.

I'm certain that Erica wrote those words. They amply demonstrate her sense of fun and hint at her dedication to reptiles and amphibians. She works at being the best in her field and keeping her sense of humor. A better person could not have been found to deliver her talk.

She opened with a movie poster of *The Good, the Bad, and the Ugly* with an added "by a CVT without a name" and began by defining poop, essentially the undigestibles such as tomato skins, insect parts, human hair, bones, millet, stones and sand. Throw in pigments from broken-down red blood cells, some mucus, cellular debris, and bacteria and you have some . . . excrement (I'm struggling here!) Vets seem to be obsessed with scat (surely not all of them, Erica?), because observation of feces can help determine the state of the digestive tract, stress levels, various disease processes, hydration status, and reveal the presence of parasites. With the picture of a horned frog having just . . . defecated, Erica told us that vets stare at poop. How they stare at it filled the next slide. Vets and vet techs use fecal floats, sedimentation, acid fast staining, PCR, gram stains and direct smears to probe the mysteries of manure. None of those could be as fun as they sound, but Erica told us which are used most and for what. And she gave us instructions for the care and handling of the samples. The fresher the better. If a sample can't be run within two hours, wrap it in plastic or foil and refrigerate it. It should last 6–8 hours. Don't freeze the samples. Samples run for *Giardia* and trichomonads should be run within thirty minutes. Protozoans and trophozoites are delicate and fragile and are best tested for within a few hours.

The next slide was another *The Good, the Bad, and the Ugly* poster featuring Clint Eastwood and introducing "our feature presentation." The good (illustrated with a picture of Clint, for whom Erica seems to have a certain fondness) included the microbiome (or normal intestinal flora) consisting of gram-negative anaerobic and some gram-positive bacteria that ferment unused energy substances, train the immune system, prevent growth of harmful bacteria, regulate the development of the gut, produce vitamins, and produce some hormones that direct the host to store fat. Intestinal fauna should only exist in herbivores and some omnivores, mainly chelonians and lizards. Ciliated protozoa, which Erica declared cute, help break down vegetable matter.

A picture of Lee Van Cleef naturally proceeded the bad intestinal denizens. Parasites can cause such symptoms as poor appetite, vomiting, abnormal stool, constipation, weight loss, and diarrhea. Most are protozoa and are more common in wild-caught animals than captive-bred, but pinworms and other nematodes (or roundworms) can also cause complications for your animals' health. If your tortoise is prone to diarrhea it may be suffering from a yeast overgrowth—usually caused by a diet high in fruits.

Staying with her theme, Erica showed a slide of Eli Wallach to start off her section on the ugly, or how good feces and bad feces should appear. She explored defecation quirks such as leopard geckos tending to defecate in one spot and the typical

frequency of defecation by various animals. We saw a slide of what diarrhea looks like (it's not just loose stool!) and feasted our eyes on results of constipation and inspissation among other abnormalities. Erica showed us photos of green feces and black feces, mummified feces and urates. Inspissation is the result of feces becoming thickened and dried from sitting in the colon too long and can lead to blockage and even rupture. Red-tailed boas and other large constrictors may suffer inspissation as a result of being fed too large prey. Erica suggested that always feeding your animal the largest prey it can handle may not be a good idea. If an herbivore's or omnivore's feces are green, this may simply be the result of eating turnip or mustard greens and is usually not harmful.

Urates, unless they are a "cool" color other than white, should be excluded from a fecal sample requested by the vet. Erica claimed that she's actually used the chalklike urates of some animals to write with and suggested the audience try. I think I'll pass. In answer to a question about refreezing uneaten rodents, Erica said to avoid refreezing any that had changed color.

Sitting through a presentation about excrement may not be anyone's idea of a good time, but with wit and much knowledge, Erica Mede drew a huge crowd to a fine overview of an important part of husbandry. It may not be everyone's cup of tea, but feces are an important indicator of your animal's health and well-being. Erica could not and didn't try to make diagnosticians out of us, but her grasp of the subject and her handling of the presentation did give all of us a better idea of what to consider while we're cleaning our animals. At one point in her presentation, after one of her slides of the movie came on screen, she checked to see how many of us had seen *The Good, the Bad, and the Ugly*. She wanted confirmation that she was "not the only one who thought she was hilarious." I can assure her that she wasn't. She had a lot of good . . . stuff.

*Bull. Chicago Herp. Soc. 48(8):112, 2013*

## The Tympanum

We are writing to express our sincere thanks for the Chicago Herpetological Society's 2013 contribution of US$1,000 to support the global coordination of the Amphibian Ark. Amphibians are a critical part of healthy ecosystems and your contribution will help us protect those in danger of extinction. We are very grateful for your support.

As a joint effort of the World Association of Zoos and Aquariums, the IUCN/SSC Conservation Breeding Specialist Group, and the IUCN/SSC Amphibian Survival Alliance, the Amphibian Ark is working to facilitate the response of the zoo and aquarium community to the current amphibian extinction crisis. As you know, more than a third of amphibian species are threatened, with many facing imminent extinction if no actions are taken. For those amphibian species that cannot currently be saved in nature, the Amphibian Ark is coordinating with zoos, aquariums, and other institutions around the world to place these animals in biosecure facilities for safekeeping and breeding until the threats to the wild populations can be controlled. We help to provide the needed coordination of these efforts, along with training, technical assistance, and publicity that will help all organizations to conduct effective and efficient amphibian conservation programs. Since 2006, we have assessed 43% of all amphibian species (64% of the threatened amphibian species) for their conservation needs. We are currently tracking over 130 priority amphibian species in captivity. Our ultimate vision is *the world's amphibians safe in nature*.

You can find out more about our activities by visiting our web-site www.amphibianark.org and reading our 5 year report here www.amphibianark.org/pdf/AArk-5-year-report.pdf.

We have been able to respond appropriately and quickly to this high profile conservation crisis because we have support from organizations such as yours. With your help and commitment, the Amphibian Ark will continue to help the ex situ community use their considerable expertise to help amphibians. Thank you again for your valued contribution.

Most sincerely,

**Lena M. Lindén, World Association of Zoos and Aquariums**
**Phil Bishop, Amphibian Survival Alliance**
**Onnie Byers, Conservation Breeding Specialist Group,**
**AArk Executive Committee Chair**

# Herpetology 2013

In this column the editorial staff presents short abstracts of herpetological articles we have found of interest. This is not an attempt to summarize all of the research papers being published; it is an attempt to increase the reader's awareness of what herpetologists have been doing and publishing. The editor assumes full responsibility for any errors or misleading statements.

## AUTOMATED RADIO TELEMETRY FOR SNAKES

M. P. Ward et al. [2013, J. Herpetology 47(2):337-345] evaluated an automated telemetry system that can dramatically increase the amount of activity and spatial data collected for snakes. They developed methods for analyzing data from single automated receiving units (ARUs) and ARU arrays, compared results from ARUs with conventional hand tracking, and assessed previously untested assumptions used in conventional telemetry, using data from ratsnakes (*Pantherophis* spp.) in Texas and Illinois. ARU data indicated that ratsnakes spent most of their time in small home ranges (mean = 25 ha) but engaged in forays of up to 1.5 km from their core-use areas, suggesting this species may engage in central place foraging. Forays inflated home-range sizes greatly if areas were estimated using minimum convex polygons rather than 95% kernels. Large numbers of locations generated by ARUs produce more reliable home-range estimates than those from hand tracking. ARU data indicated that snakes moved in response to observers during hand tracking. Daily hand tracking produced reliable estimates of distances moved but underestimated distances by a factor of 4 when snakes were tracked every 5 days. Drawbacks of ARUs are that the error associated with individual locations exceeds that for hand-tracked locations and that the costs exceed those for hand tracking. Automated receivers can increase data greatly from radio-tracked snakes, providing novel insights unavailable from conventional hand tracking. There are drawbacks to this technology, some of which will vary among study species; therefore, researchers should evaluate the appropriateness of the technology for both the study species and the questions being asked.

## BROWN ANOLES RESPOND TO BIRD CALLS

L. R. Cantwell and T. G. Forrest [2013, J. Herpetology 47(2):293-298] note that many studies indicate that various vertebrates and invertebrates use sensory cues to recognize predators and to evaluate predation risk. Lizards and birds frequently occupy the same habitats; consequently, avian predation on lizards has been implicated as an important selective pressure on lizard behavior. However, there are few studies on how lizards respond to nonvisual cues. The response of adult male brown anoles (*Anolis sagrei*) to calls of birds was studied to determine whether they use auditory cues as an indicator of predation risk from birds. Anoles responded significantly more often with head tilt (increased vigilance) during playback of predatory vocalizations (kestrel and red-tailed hawk calls) compared with low-risk stimuli (nonpredatory bird calls and white noise). Responses to auditory cues suggest that male brown anoles are able to distinguish the calls of birds known to prey upon lizards from the calls of nonpredatory birds. More important, this study demonstrates that anoles, most of which are nonvocal, are able to obtain information about predation risk through the use of auditory cues and that the role of hearing in these lizards has been underappreciated.

## BULLFROG TADPOLES SHOW PERSONALITY

B. E. Carlson and T. Langkilde [2013, J. Herpetology 47(2): 378-383] note that variation in personality traits is observed commonly in many taxa but has been rarely studied in amphibians. They tested whether individual bullfrog tadpoles exhibit personality, behaving consistently across multiple trials, and differently from conspecifics. From video footage of individual tadpoles in a familiar (home) environment and a novel environment (open field), we obtained measures of their level of activity, boldness, and exploration behavior over multiple trials. We found that activity level did not differ consistently between individuals. Boldness was moderately repeatable and exploration highly repeatable within individuals across trials, but only exploration varied significantly among individuals. These findings provide evidence of typical personality traits in tadpoles and support the value of bullfrog tadpoles as model organisms in personality research.

## AQUATIC TURTLES AND GOLF COURSE PONDS

S. J. Price et al. [2013, J. Herpetology 47(2):243-250] note that golf courses represent a common type of anthropogenically modified habitat in suburban environments. Golf courses may provide suitable habitat for semi-aquatic animals in suburban areas, yet studies comparing animal abundances in golf course ponds with other pond types in suburban environments are somewhat limited. The authors compared turtle abundances in golf course ponds with ponds found in residential areas and ponds found in rural (farm) areas, and examined the relationship between turtle abundance and residential land-cover within individual golf courses. They captured turtles in 10 golf course ponds, 5 ponds surrounded by residential development, and 5 ponds located on farms. They estimated abundance and the effects of pond area, pond type (i.e., residential, golf, farm) and percentage of residential development within golf course boundaries. Using binomial mixture models and Bayesian inference, it was found that ponds surrounded by residential development had lower abundances of painted turtles (*Chrysemys picta*) and sliders (*Trachemys scripta*) than ponds located on golf courses and farms. Additionally, golf courses that have a greater amount of residential development within course boundaries had fewer turtles than courses that contained minimal residential development. These results suggest that golf courses can offer suitable habitat for semi-aquatic turtles in suburban areas. However, residential development within golf course boundaries appears to have a negative effect on local abundances. Thus, if golf courses are to be seen as reserves for wetland-dependent animals, golf courses with low housing density should be considered as a more preferable option than courses associated with extensive residential development.

## SUSCEPTIBILITY TO CHYTRIDIOMYCOSIS

M. E. Ortiz-Santaliestra et al. [2013, J. Herpetology 47(2): 286-292] note that *Batrachochytrium dendrobatidis* (Bd), the fungus responsible for chytridiomycosis, grows on the keratinized parts of the body (i.e., the entire skin of juveniles and adults, and the oral disk of tadpoles). The fungus affects epidermal structures, generating an imbalance of the osmotic equilibrium through the skin that ultimately leads to death. Therefore, larvae are likely to be much more resistant compared with juveniles and adults, which may suffer high mortality. However, nothing is known about how susceptibility varies during the juvenile life stages (from the end of metamorphosis to sexual maturity). The coexistence of tolerant hosts (either tolerant species or unaffected developmental stages) with susceptible hosts is a major reason why chytridiomycosis has become an epidemic disease. The aim of this study was to analyze the interspecific and developmental variation in susceptibility to Bd in juveniles of three North American anurans. Leopard frog (*Lithobates pipiens*) incurred no lethal effects at 104 Bd zoospores $ml^{-1}$, regardless of the age at which they were exposed to the fungus. On the contrary, Bd infection was more severe for newly metamorphosed juveniles of American toads (*Anaxyrus americanus*) than for 4-week-old juveniles. When exposed to 104 Bd zoospores $ml^{-1}$, newly metamorphosed juveniles of this species experienced mortality rates above 70%, whereas 4-week-old juveniles had mortality rates below 30%. Variations in structural characteristics of the skin or the antifungal efficiency of skin peptides are proposed as potential reasons to explain the observed developmental differences in susceptibility to Bd.

## CONSERVATION GENETICS OF CRAWFISH FROGS

S. O. Nunziata et al. [2013, J. Herpetology 47(2):361-368] note that crawfish frogs (*Lithobates areolatus*) are a North American ranid, considered near threatened globally with populations in decline throughout their range. They studied populations of crawfish frogs on local and regional scales at their northeastern range limit to (1) assess the level of genetic diversity within populations, (2) estimate fine-scale genetic structure, and (3) estimate genetic differentiation between populations at the regional level. They used 10 microsatellite loci to genotype frogs collected from three regional sites in Indiana separated by 50–172 km and at one of these sites within a network of three breeding ponds <1 km apart. Heterozygosity estimates revealed high levels of diversity within these populations, which is encouraging for future management. The degree of population subdivision was low at the regional level. Genetic differentiation was related to geographic distance between sampling sites, as predicted by an isolation-by-distance model. They observed no genetic differentiation between individuals sampled from ponds approximately 250 m apart and slight divergence of individuals from a pond approximately 750 m away. This suggests ponds within 1 km form a genetically distinct single breeding unit composed of multiple subpopulations. Finally, they saw high genetic differentiation between southwest and southeast Indiana sites indicating historical (rather than recent) isolation of these sites. These data will be applied to a regional management plan in an attempt to recover crawfish frogs along the northeastern extreme of their range.

## LEATHERBACK NESTING BEACHES

J. H. Roe et al. [2013, Chelonian Conservation and Biology 12(1):34-43] note that coastal development can alter the natural dynamics of beach environments, with strong implications for associated biota. Sea turtles nest on oceanic beaches and often depend upon a specific range of conditions for successful nesting. In the case of the critically endangered leatherback turtle (*Dermochelys coriacea*), little is known regarding what features they select for nest sites, including how they respond to anthropogenic development. The authors examined relationships between leatherback nest frequency, beach environments, and tourism development at Playa Grande, Costa Rica, the location of the largest current nesting population in the eastern Pacific Ocean. Developed beach sections had shallower slopes, lower pH, and less air-filled pore space, but higher water content and salinity than undeveloped areas. Developed areas were also comprised of more sand in the smaller grain size classes relative to undeveloped sections. Leatherback nesting was positively correlated with deepness of the offshore approach, beach slope and elevation, pH, and sand in intermediate size classes (0.025-mm diameter), but negatively correlated with sand in the smallest silt size class (< 0.0625-mm diameter). Leatherback nesting frequency was 3.4 times higher in undeveloped sections of the beach relative to developed areas, while nonnesting emergences were 2.6 times more likely in developed relative to undeveloped areas. It is apparent that coastal development has impacted beach environments with consequences for leatherback nest site distribution. It is likely that additional development of the beach under mixed-management plans to support a growing tourist industry will further degrade the attractiveness and quality of the beach for leatherback nesting.

## FISH AND FERTILIZER AFFECT TADPOLES

G. R. Smith et al. [2013, Copeia 2013(2):248-253] note that invasive fish frequently negatively affect amphibian populations around the world. In agricultural regions of the world, the effects of invasive fish on amphibians may coincide with pollution by agricultural fertilizers. They conducted a mesocosm experiment to examine the potential independent and interactive effects of introduced western mosquitofish (*Gambusia affinis*) and ammonium nitrate, an agricultural fertilizer, on green frog (*Lithobates clamitans*) tadpoles. Mosquitofish had a negative effect on the survivorship of green frog tadpoles. Green frog tadpoles from mesocosms with mosquitofish were larger than tadpoles from mesocosms without mosquitofish, possibly due to a thinning effect that reduced intraspecific competition, as well as increased primary productivity. Ammonium nitrate additions did not affect survivorship in green frogs. However, green frog tadpoles in ammonium nitrate addition treatments were larger than those from treatments without ammonium nitrate addition, possibly due to increased phytoplankton abundance. In conclusion, mosquitofish and ammonium nitrate addition each had independent and additive effects on green frog tadpoles, but there was no evidence for significant interactions between these two stressors. The results suggest that environmental stressors can have additive effects in some systems and that introduced fish predators may have greater impacts on amphibian populations than low level chemical contamination.

# Unofficial Minutes of the CHS Board Meeting, July 19, 2013

The meeting was called to order at 7:42 P.M. at the Schaumburg Public Library. Board members Stephanie Cappiello, Jim Foster, Lawrence Huddleston and Cindy Rampacek were absent.

**Officers' Reports**

Recording Secretary: The minutes of the June 14 board meeting were read, discussed and accepted.

Treasurer: The June financial report was discussed and accepted.

Membership Secretary: Numbers are holding at just under 500. The list of expiring memberships was read.

**Committee Reports**

Shows:
- Notebaert Nature Museum, first full weekend of each month.
- Argonne Labs picnic, July 20
- Museum of Science and Industry Members' Night, July 24.
- SEWERFest, August 4.
- Red Oak Nature Center, Bug Fest, August 24.
- Notebaert Nature Museum Trivia Night, 6–9 P.M., August 27.

**Old Business**

Herps of Illinois: The group discussed formalizing a policy in regard to herps collected from the wild to exhibit at ReptileFest. Bob Bavirsha will draft a letter to contact nature centers regarding housing native species after 'Fest. We also need to look at adding this policy to 'Fest guidelines.

Membership brochures/cards: Mike has had more membership brochures printed.

Lavalier microphone system: Andy will order the system that Josh has recommended and have it shipped to Mike's office.

**New Business**

Updating websites for CHS and ReptileFest: We are looking for volunteers to work on updating both websites.

Meeting attendance—general and board: We need ideas to increase attendance at our meetings.

BOD resignation: Lawrence Huddleston has resigned his position on the board. Jason appointed Dick Buchholz to fill his position for the rest of the year.

Chicago Wilderness: Mike moved to continue our membership. Linda seconded, and the motion passed unanimously.

December general meeting: The December meeting date has been changed from the last Wednesday, which falls on the 25th, to Thursday, December 26.

**Round Table**

Bob Bavirsha has fox snake eggs, and showed a photo, wondering if they are good.

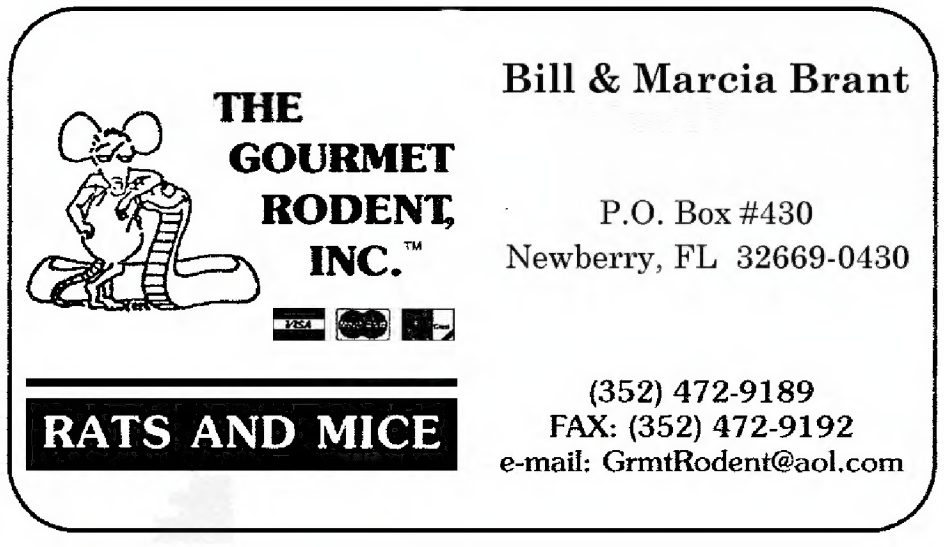
Aaron mentioned that SEWERFest sold more tables this year than ever before.

Mike Dloogatch noted that the CHS received review copies of a field guide to the reptiles and amphibians of Costa Rica, in both English and English/Spanish versions, published by Cornell. He recommended them.

Nancy Kloskowski brought samples of her artwork to the board meeting.

The meeting was adjourned at 9:24 P.M.

*Respectfully submitted by Jenny Vollman*

# Advertisements

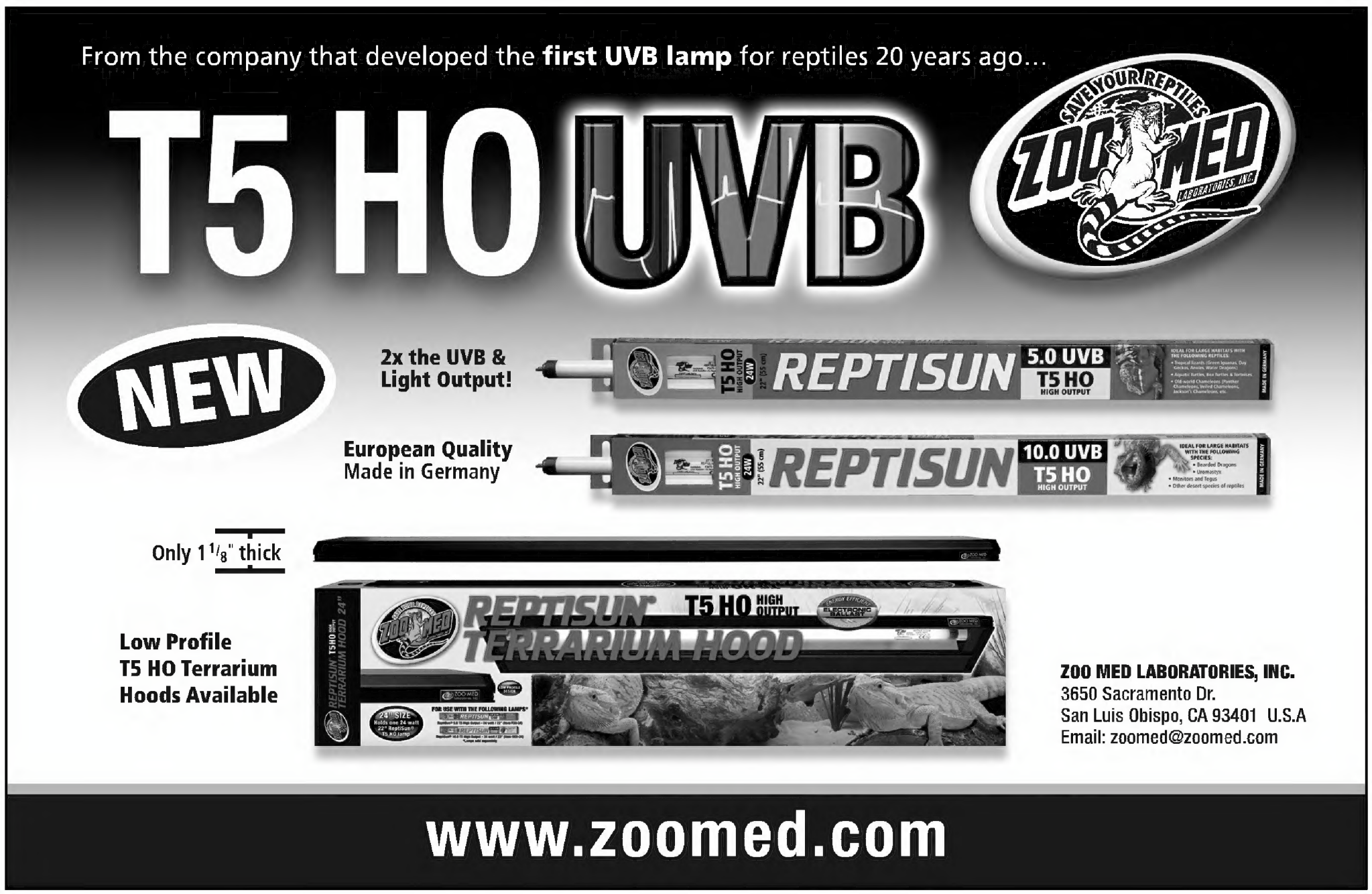
For sale: rats and mice—pinkies, fuzzies and adults. Quantity discounts. Please send a SASE for pricelist or call Bill Brant, *THE GOURMET RODENT*, PO Box 430, Newberry, FL 32669-0430, 352-472-9189, E-mail: GrmtRodent@aol.com.

For sale: **highest quality frozen rodents**. I have been raising rodents for over 30 years and can supply you with the highest quality mice available in the U.S. These are always exceptionally clean and healthy with no urine odor or mixed in bedding. I feed these to my own reptile collection exclusively and so make sure they are the best available. All rodents are produced from my personal breeding colony and are fed exceptional high protein, low fat rodent diets; no dog food is ever used. Additionally, all mice are flash frozen and are separate in the bag, not frozen together. I also have ultra low shipping prices to most areas of the U.S. and can beat others shipping prices considerably. I specialize in the smaller mice sizes and currently have the following four sizes available: Small pink mice (1 day old—1 gm) , $25 /100; Large pink mice (4 to 5 days old—2 to 3 gm), $27.50 /100; Small fuzzy mice (7 to 8 days old—5 to 6 gm) , $30/100; Large fuzzy mice / hoppers (10 to 12 days old—8 to 10 gm), $35/100 Contact Kelly Haller at 785-234-3358 or by e-mail at kelhal56@hotmail.com

For sale: High quality, all locally captive-hatched tortoises, all bred and hatched here in the upper midwest. Baby leopards, Sri Lankan stars, and pancakes usually available, and are all well-started and feeding great! Leopards are $125 ea., Sri Lankans (2012 hatched) $475 ea. And Pancakes are $195 ea. Leopards for out of state sale/shipping require a veterinary health certificate (inquire for cost). E-mail at KKranz1@wi.rr.com or call Jim or Kirsten at 262 654 6303.

Herp tours: **Costa Rica herping adventures**. Join a small group of fellow herpers for 7 herp-filled days. We find all types of herps, mammals, birds,and insects, but our target is snakes. We average 52 per trip, and this is our 10th year doing it. If you would like to enjoy finding herps in the wild and sleep in a bed at night with air-conditioning, hot water and only unpack your suitcase once, instead of daily, then this is the place to do it. Go to our web-site http://hiss-n-things.com and read the highlights of our trips. Read the statistics of each trip and visit the link showing photos of the 40 different species we have found along the way. E-mail at jim.kavney@gmail.com or call Jim Kavney, 305-664-2881.

Line ads in this publication are run free for CHS members—$2 per line for nonmembers. Any ad may be refused at the discretion of the Editor. Submit ads to mdloogatch@chicagoherp.org.



From the company that developed the first UVB lamp for reptiles 20 years ago...
T5 HO UVB
SAVE YOUR REPTILES
ZOO MED
LABORATORIES, INC.
NEW
2x the UVB & Light Output!
REPTISUN 5.0 UVB T5 HO HIGH OUTPUT
European Quality Made in Germany
REPTISUN 10.0 UVB T5 HO HIGH OUTPUT
Only 1 1/8" thick
REPTISUN T5 HO HIGH OUTPUT TERRARIUM HOOD
Low Profile T5 HO Terrarium Hoods Available
ZOO MED LABORATORIES, INC.
3650 Sacramento Dr.
San Luis Obispo, CA 93401 U.S.A
Email: zoomed@zoomed.com
www.zoomed.com

## UPCOMING MEETINGS

The next meeting of the Chicago Herpetological Society will be held at 7:30 P.M., Wednesday, August 28, at the Peggy Notebaert Nature Museum, Cannon Drive and Fullerton Parkway, in Chicago. **Desiree Wong** will be sharing her experiences from the Shedd Aquarium's Iguana Research Expedition to Andros, Bahamas, earlier this year. Desiree started out as a hobbyist, making small contributions to green iguana keeping. Eventually, a trip to Grand Cayman and experiences with the Grand Cayman blue iguanas led her to become actively interested in conservation. For a number of years, she promoted reptile and amphibian conservation via the International Reptile Conservation Foundation, performing education and outreach at reptile shows across the county. She hopes to continue making contributions to *Cyclura* species conservation, with future trips planned to the Carribean and Bahamas.

At the September 25 meeting, **Justin Julander**, co-author of *The Complete Carpet Python*, will be talking about these and other Australian herps.

The regular monthly meetings of the Chicago Herpetological Society take place at Chicago's newest museum—the **Peggy Notebaert Nature Museum**. This beautiful building is at Fullerton Parkway and Cannon Drive, directly across Fullerton from the Lincoln Park Zoo. Meetings are held the last Wednesday of each month, from 7:30 P.M. through 9:30 P.M. Parking is free on Cannon Drive. A plethora of CTA buses stop nearby.

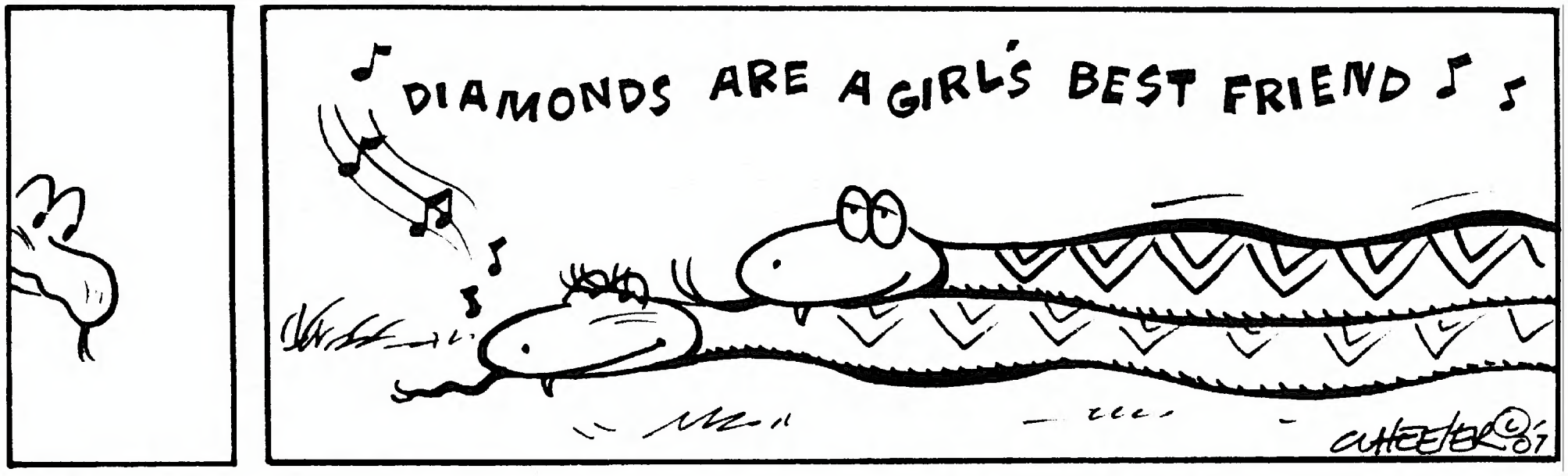
### Board of Directors Meeting

Are you interested in how the decisions are made that determine how the Chicago Herpetological Society runs? And would you like to have input into those decisions? If so, mark your calendar for the next board meeting, to be held at 7:30 P.M., September 13, in the adult meeting room on the second floor of the Schaumburg Township District Library, 130 S. Roselle Road, Schaumburg..

### The Chicago Turtle Club

The monthly meetings of the Chicago Turtle Club are informal; questions, children and animals are welcome. Meetings normally take place at the North Park Village Nature Center, 5801 N. Pulaski, in Chicago. Parking is free. For more info visit the group's Facebook page.

## THE ADVENTURES OF SPOT



Periodicals Postage
Paid at Chicago IL

# CHICAGO HERPETOLOGICAL SOCIETY

*Affiliated with the Chicago Academy of Sciences*

2430 North Cannon Drive • Chicago, Illinois 60614